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DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

SPECIFICATION

ESTABLISHMENT OF AIR ROUTE SURVEILLANCE RADAR (ARSR-3) SYSTEM

1. SCOPE

1.1 Scope. - This specification sets forth requirements for the establishment of a Federal Aviation Administration Air Route Surveillance Radar (ARSR-3) System. The requirement is for a full turnkey installation which includes fabrication, factory installation and checkout of ARSR-3 components in a transportable modular building complex, on-site installation, checkout and test. The ARSR-3 system as herein described shall include the primary radar, the secondary beacon and associated ancillary equipments. The ARSR system shall operate as an integral part of the NAS Stage A Radar Acquisition and Data Transfer Subsystem. The primary (search) and secondary (beacon) position data will be remoted by narrow band techniques to one or more associated air route traffic control centers (ARTCC) for further processing and display. The position data is used in the control of en route air traffic.

2. APPLICABLE DOCUMENTS

2.1 Applicable documents. - The following specification, standards, or other documentation form a part of this specification and are applicable in their entirety unless otherwise specified herein. The applicable issues of these specifications are listed in the invitation for bids of the request for proposals.

2.1.1 FAA specifications. -

FAA-E-2483b	Air Route Surveillance Radar (ARSR-3)
FAA-E-2483b, Sup. 3	ARSR-3 Integrated Beacon Feed System
FAA-E-2319b	Air Traffic Control Beacon Interrogator
FAA-C-1217c	Electrical Works Interior
FAA-C-2498	Air Route Surveillance Radar (ARSR-3) Antenna Tower
FAA-C-2497a	ARSR-3 Building and Engine Generator System
FAA-C-2499a	Air Route Surveillance Radar (ARSR-3) Rigid Radome
FAA-C-2100/1b	Parts 1 through 5, Electronic Equipment General Requirements
FAA-C-1247	Specification for Erection of Self Supporting Towers
FAA-C-1244b	Installation of Engine-Generators and Fuel Tank
FAA-G-1210C	Provisioning Technical Documentation
FAA-D-2494	Parts 1 and 2. Instruction Books Manuscripts Technical: Equipment and System, Requirements
FAA-E-2552	Technical Training

2.1.2 FAA standards. -

FAA-STD-013a	Quality Control Program Requirements
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2.1.3 Military and Federal publications. -2.1.3.1 Military standards. -

MIL-STD-461A (and Notice 3)	Electromagnetic Interference Characteristics Requirement for Equipment
MIL-STD-483	Configuration Management Practices For Systems, Equipment, Munitions, and Computer Programs

2.1.3.2 Federal standards. -

AC-00-27 Advisory Circular, U. S. National
Standard for the IFF Mark X (SIF)/
Air Traffic Control Radar Beacon
System Characteristics

2.1.3.3 Other publications. -

GSA Catalogue, Part III, Hand Tools
National Electrical Code

(Copies of this specification and other FAA specifications, standards, and drawings may be obtained from the Contracting Officer in the Federal Aviation Administration Office issuing the invitation for bids or request for proposals. Request should fully identify material desired, i.e., specification, standard, amendment, and drawing numbers and dates. Request should cite the invitation for bids, request for proposals, or the contract involved, or other use to be made of the requested material.)

(Single copies of military specifications and standards may be requested by mail or telephone from the U. S. Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pa., 19120; for telephone requests, call 215-697-3321, 8 a.m. to 4:30 p.m., Monday through Friday. Not more than five items may be ordered on a single request. The applicable invitation for bid or contract number shall be cited.)

(Information on obtaining copies of the National Electrical Code may be obtained from National Fire Protection Association, 60 Batterymarch Street, Boston, Mass., 02110.)

2.2 Precedence of documents. - When the requirements of the contract or subsidiary applicable documents are in conflict, the following shall apply.

2.2.1 The contract. - The contract shall have precedence over all other documents.

2.2.2 Specification. - This specification shall have precedence over all subsidiary documents referenced herein. The supplements to this specification, when issued, are considered part of this specification when their use is a requirement of the contract.

2.2.3 Applicable documents. - Any subsidiary applicable documents referenced herein.

3. REQUIREMENTS

3.1 Summary of equipment and services to be furnished by the contractor. - The contractor shall furnish the quantity of ARSR systems specified in the contract. Each ARSR system shall consist of electronic and plant

equipment packages and shall include the major items tabulated below. The contractor shall furnish all materials and services necessary to transport, install, align and test the ARSR radar electronic equipment system packages including ARSR/ATCRBS antennas, ARSR tower and radome, and standby engine generator subsystems at the locations specified by the Government. The ARSR system electronic equipment packages shall be integrated with each other and installed into the ARSR modular buildings, together with all necessary interface cabling (wiring), parts, waveguide, hardware, etc., necessary to install the ARSR system at Government designated site(s). The Government will have selected and acquired the radar site and accomplished site preparation to include foundation and utility requirements for the ARSR modular buildings and the ARSR tower. The ARSR radar system complex shall be completely operational and ready for FAA acceptance testing upon completion of these tasks. Any equipment, item, part, or service not specifically designated in the contract as Government furnished, necessary for the proper operation of the ARSR systems in accordance with this specification, shall be furnished by the contractor even though that equipment, item, part, or service may not be specifically provided for or described herein. The contractor shall furnish "as built" installation drawings and "as built/as installed" technical data packages. Final acceptance of any equipment, subsystem, or system is conditional on the on-site acceptance of that equipment, subsystem, or system as an integral part of the complete ARSR system complex.

3.1.1 ARSR-3 Electronic Equipment Package to be furnished by the contractor.-

- (a) Air Route Surveillance Radar (ARSR-3) Subsystem (3.3.2.1).
- (b) ATCRBS Subsystem (3.3.2.2).
- (c) Antenna, Integrated Beacon Feed Subsystem (3.3.2.3).
- (d) Antenna, ATCRBS, SLS Omni-Directional Antenna Subsystem (3.3.2.4).
- (e) ATCRBS Test Set (3.3.2.5).

3.1.2 ARSR-3 Plant Equipment Package to be furnished by contractor.-

- (a) ARSR-3 Building and Engine Generator Subsystem (3.3.2.6).
- (b) ARSR-3 Antenna Tower Subsystem (3.3.2.7).
- (c) ARSR-3 Antenna Radome Subsystem (3.3.2.8).

3.1.3 Other materials and services to be furnished by contractor.-

- (a) System Integration (3.4).
- (b) Integrated Logistic Support (3.6).

- (c) Data and Documentation (3.5).
- (d) Integrated System Test (3.7).
- (e) On-Site Installation and Test (3.8).

3.2 Definitions. -

3.2.1 ARSR System. - The following paragraphs describe the various electronic and plant equipment subsystems that are a part of the ARSR system:

3.2.1.1 ARSR-3 Subsystem. - A basic primary radar configuration consisting of two complete channels (each consisting of a transmitter, receiver, and MTI system), an antenna system, and other ancillary subsystems and items as required.

3.2.1.2 ATCRBS Subsystem. - Two separately controlled beacon interrogator/receiver channels with provisions for inter-channel switching of antenna and control functions such that either a dual channel or single channel configuration may be employed as desired.

3.2.1.2.1 Antenna, ATCRBS, SLS Omni-Directional Subsystem. - Side lobe suppression (SLS) omni-directional antenna system which operates in conjunction with the FAA Air Traffic Control Radar Beacon System (ATCRBS). The antenna radiates a pulse which is used to effect suppression of false target returns caused by side lobe radiation of the ATCRBS directional antenna.

3.2.1.2.2 Antenna, ARSR-3 Integrated Beacon Feed System. - Integrated Beacon Feed antenna system for directional transmission and reception of ATCRBS interrogations and transponder reply codes respectively.

3.2.1.2.3 ATCRBS Test Set Subsystem. - Portable test set for monitoring equipments for use at the transmitter site. Both video and RF test functions of the ATCRBS Test Set will be used.

3.2.1.3 ARSR-3 Building and Engine Generator System. - Transportable transmitter/receiver building and engine generator system for ARSR-3 facilities. Building consists of five modules and shall house all the components, including radar, beacon, microwave remoting, communications and common digitizer equipment, test equipment, electrical, mechanical, sanitary and water systems, storage facilities, work areas, engine generator, etc., required for a complete, self-sufficient dual channel, long range radar transmitter/receiver facility.

3.2.1.4 ARSR-3 Antenna Tower. - Standard antenna tower for ARSR-3 facilities for support of radar antenna system specified in FAA-2498.

3.2.1.5 ARSR-3 Antenna Radome. - Standard antenna radome for ARSR-3 facilities specified in FAA-C-2499a.

3.2.1.6 Ancillary Equipment. - All standard tools and test equipment required for on-site maintenance of the ARSR system.

3.2.1.7 ARSR System Support Package. - Electronic, plant and ancillary equipment required for the support of operational radars in the field. These packages will be used to fulfill training equipment, en route mobile radar facility equipment, and Depot level repair test bed facility equipment requirements.

3.2.1.8 ARSR System Electronic Equipment Package. - Package consists of ARSR-3, ARSR-3 antenna system with Integrated Beacon Feed, ATCRBS, and ATCRBS SLS omni-directional antenna subsystem.

3.2.1.9 ARSR System Plant Equipment Package. - Package consists of ARSR-3 Building and E/G System, ARSR-3 Antenna Tower and ARSR-3 Antenna Radome.

3.2.1.10 Subsystem/system. - The various electronic and plant equipment subsystems as herein defined are commonly referred to in their individual specifications as systems. In the application specified herein, these equipments are an integral part of the ARSR system and is referred to herein as the subsystem.

3.2.1.11 ARSR system complex. - An installed system including the electronic equipment, buildings, standby power plant, physical site(s), radar tower, radome, etc.

3.2.1.12 Transmitter site. - The physical location where the ARSR transmitter/receiver equipments are located. Commonly referred to in associated specifications as the "radar site." These two terms are used interchangeably.

3.2.1.13 Air Route Traffic Control Center (ARTCC). - That physical location where the radar information is to be displayed and used by air traffic control personnel.

3.3 ARSR System Requirements. -

3.3.1 System grounding. - A common ARSR system site grounding design criterion shall be used for all subsystems, equipments, and units to be delivered under this specification. The grounding design shall contain at least three discrete grounding busses:

- (a) One that bonds together all cabinets and frames.
- (b) One that connects all video and trigger signal return paths within each cabinet together.
- (c) One that connects all AC power grounds together.

In addition separate ground busses shall be provided for any high noise return ground paths such as those containing transients in high inductance circuits. The cabinet/frame buss, the signal return buss,

and any high noise return busses shall be isolated from each other except they are to be connected together at a common point. This common point shall be connected to the building (earth) ground. The AC power ground buss shall be connected directly to the building (earth) ground at a single point and shall be isolated from the cabinet/frame buss, the signal return buss, and any high noise return buss.

The design of the ARSR system grounding including conductor size and buss distribution shall be such that no AC power circuits or signal transients are coupled between circuits through the grounding system. The design of each subsystem, equipment, and unit shall be such that its internal grounding provisions are compatible with all other subsystems, equipments, and units internal grounding provisions in system.

3.3.2 Equipment requirements. - Instruction book requirements are covered in paragraph 3.6.1.2.

3.3.2.1 ARSR-3 Subsystem. - ARSR-3 subsystem shall be furnished as specified in Specification FAA-E-2483b.

3.3.2.2 ATCRBS subsystem. -

3.3.2.2.1 ATCRBS subsystem. - The ATCBI, if required by the contract schedule, shall be furnished as specified in Specification FAA-E-2319b modified as tabulated below:

- (a) All power, control, video/trigger, and RF cables (FAA-E-2319b, paragraph 3.1.2.3) required for inter-channel connections and for connections between the individual channel equipments and external equipments shall be pre-fabricated and furnished. The RF cable for connection between the beacon antennas and the beacon interrogator is provided under paragraph 3.8.7.4 of the ARSR-3 Specification, FAA-E-2483b.
- (b) Equipment design shall incorporate grounding requirements of paragraph 3.3.1 herein.
- (c) Data on cable, space, and power requirements (FAA-E-2319b, paragraph 3.2.4) are not required.
- (d) Delete references to Government furnished equipment (FAA-E-2319b, paragraph 3.4.6.1).

3.3.2.2.2 Options. - The following options of Specification FAA-E-2319b shall be furnished:

- (a) Monitor group, paragraph 3.1.1.2 of FAA-E-2319. Two each shall be provided with each interrogator group.

3.3.2.3 Air Traffic Control Radar Beacon System (ATCRBS) Integrated Beacon Feed antenna subsystem. - Shall be furnished in accordance with Specification FAA-E2483b, supplement 3.

3.3.2.4 Air Traffic Control Radar Beacon System (ATCRBS) SLS omni-directional antenna subsystem. - Shall be furnished as specified in specification FAA-E-2483b supplement 3. The antenna assembly is to be mounted atop the ARSR-3 antenna as specified in paragraph 3.8.7.4.1 of supplement 3 to FAA-E-2483b.

3.3.2.5 Air Traffic Control Radar Beacon System (ATCRBS) Test Set Subsystem. - The ATCRBS test set, if required by the contract schedule, shall be furnished in accordance with Specification FAA-E-2502 modified as follows:

- (a) Requirements for transmitter site test equipment only are applicable.

3.3.2.6 ARSR buildings. -

3.3.2.6.1 Definitions. -

3.3.2.6.1.1 ARSR building. - Transportable electronic system building at the transmitter site consisting of five modules. Four modules shall house all the components, including radar, beacon, microwave remoting (if required), communications, and common digitizer equipment, test equipment, electrical, mechanical, sanitary, and water systems, storage facilities, work areas, etc., required for a complete self-sufficient, dual channel, long range radar facility. The fifth module shall house a complete engine generator (E/G) system.

3.3.2.6.1.2 Utilization. - The buildings and towers specified herein will be installed on sites throughout the United States. The radar site complex will be a visual sign to the public of FAA operations and may be located in proximity to residential areas. As such, they shall present an architecturally pleasing appearance and reflect the precision and reliability of FAA activities with the utilitarian quality of public financed construction.

3.3.2.6.2 ARSR buildings. - ARSR buildings shall be furnished in accordance with Specification FAA-C-2497a.

3.3.2.7 ARSR-3 tower. - The ARSR-3 antenna support tower for transmitter site shall be furnished in accordance with Specification FAA-C-2498.

3.3.2.8 ARSR-3 Radome. - The ARSR-3 radome shall be furnished in accordance with Specification FAA-E-2499a.

3.3.2.9 ARSR-3 Mobile Enroute Facility (MERF). - The ARSR-3 MERF shall be furnished in accordance with Specification FAA-E-2483b, Appendix B, as provided in the contract schedule.

3.4 System integration. - The contractor shall, at his plant, integrate the ARSR-3 and the ATCRBS subsystems into a complete ARSR system electronic equipment package.

3.4.1 Integration concept. - The electronic equipments system packages prepared for delivery from the contractor's plant shall be fabricated, assembled, and installed in the transportable buildings to the maximum possible extent. Other items to be installed on-site shall be pre-fabricated whenever possible. The ARSR electronic equipment system packages shall be designed so that on-site installation effort required is held to a minimum.

3.4.2 Integration material. - The ARSR electronic equipment system package as prepared for delivery from the contractor's plant shall contain all cable (wiring), waveguide, distribution boxes, panels, supports, fasteners, parts, mounting brackets, etc., necessary to install a complete operational ARSR system at each site designated by the Government.

3.4.2.1 Installation material. - Maximum use shall be made of the installation material to be provided as equipment contract deliverable items for the equipment listed in paragraph 3.3.2 and subsidiary paragraphs. The following is a listing of the major installation material items requirements in each equipment specification.

3.4.2.1.1 ARSR-3 radar equipment. - Paragraph numbers refer to those in Specification FAA-E-2483b.

- (a) Waveguide components to be furnished (3.11.3)
- (b) Coaxial components (3.11.4)
- (c) Waveguide (3.11.10)
- (d) Beacon antenna cable and connectors (3.8.7.4)
- (e) Radar cable junction box (3.20, et al)
- (f) Primary power wiring (3.24.5)
- (g) Interconnecting duct (3.27.28)

3.4.2.1.2 ATCBI beacon equipment. - Paragraph numbers refer to those in Specification FAA-E-2319b.

- (a) Channel cable to be furnished (3.1.2.3)
- (b) RF output connectors (3.3.9.1)
- (c) RF probes (3.8.3)
- (d) Special tools (3.11)

3.5 Data and Documentation. - The contractor shall develop a data and documentation control plan, for fulfilling all ARSR system data and documentation, complete in accordance with specification requirements. A data plan and a drawing control plan are to be included in the submission. The data plan shall include the data listed as contract line items for delivery to the Government and shall be expanded to include the list of all of the deliverable documentation required in the applicable ARSR system specifications. All technical documentation shall be assigned FAA documentation numbers. The drawing control plan shall include provisions for microfilming in accordance with requirements set forth herein.

3.5.1 Submission and Approval.- The contractor shall furnish three copies of a data and documentation control plan to the Technical Officer, T. O., for approval within 30 days after contract award.

3.5.2 Configuration Management Program (CMP).- The contractor shall plan, implement, and conduct a configuration management program in consonance with MIL-STD-483. As a minimum, the configuration management program shall contain the following items identified in the Appendixes to the standard.

Item	Paragraph	Appendixes	Description
(a)	10	I	Configuration Management Plan
(b)	20	II	Interface Control
(c)	70	VII	Specification maintenance
(d)	100	X	Engineering release records and correlation of manufactured products
(e)	130	XIII	Engineering Charges

3.5.2.1 CMP Submission and Approval.- The contractor shall furnish three copies of the Configuration Management Plan to the Technical Officer, T. O., for approval within 60 days after Contract Award.

3.5.3 Drawings and technical memoranda.- The contractor shall be responsible for maintaining an up-to-date record of all internal drawings and technical documents produced or used in the design, fabrication,

and testing of the ARSR system equipments and those documents furnished the Government. The contractor shall provide the Government an index of all items. The index shall be initiated on award of the contract and shall be updated monthly for submittal with the monthly progress report. All engineering drawings submitted by the contractor shall meet the requirements of FAA-STD-002.

All lined pencil work and lettering shall be of high quality such that it can be clearly interpreted on all types of reproduction processing. Original drawings are to be prepared in Herculean, Cronaflex, Kodak mylars or equal with mylar pencil. Drawings are to be standard FAA "D" size with the FAA title block (refer to FAA-STD-002, Amendment 1, Figure 2a, dated 10/6/67).

3.5.4 Microfilm copies. - Within 90 days following final Government acceptance of the first complete ARSR system, the contractor shall furnish two complete microfilm copies of all drawings and documentation prepared for or used on the contract. The microfilm reproduction shall include all information supplied by the vendors in connection with subcontract materials. The microfilm shall be 35mm mounted in a standard FAA aperture card. Each card shall be labeled with the FAA contract number, equipment designation (ARSR-3), prime equipment manufacturer's name, and drawing or document number. If revisions to the drawings and documentation are made after the original photographing and before contract completion, replacement microfilm for the revised drawings and documentation shall be furnished within 60 days after the effective date of the revision. The first microfilm copies submitted shall be based on the ARSR-3 configuration at the time of successful completion of factory test specified in paragraph 4.3 of FAA-E-2483b.

3.5.5 Implementation Plan. - The contractor shall develop an implementation plan for the complete ARSR system program. Within 30 days after contract award, the contractor shall furnish the Government a proposed work breakdown scheme and supporting PERT time networks as set forth herein. Both of these items shall show all activities from contract award to delivery of the last production unit. All deliverable items, such as type test unit, system design data, spare parts lists, and all activities requiring Government action shall be included on the work breakdown and PERT network. The program schedules shall be organized in two levels: (a) Program summary networks and (b) Program detail networks. The program summary network shall show each significant phase of the network in accordance with the requirements of FAA-STD-007a. The summary networks are derived from and supported by the detail networks for each major hardware item.

Upon approval by the Government, the PERT network will become the master schedule on which the contractor's monthly reports will be made to the Government. Event numbers for these networks will be provided by the Government. Reports will be as of the tenth of the month and shall be delivered to the Government no later than the twentieth. Three copies shall be furnished, each in three parts:

- (a) Updated PERT networks showing actual dates for completed events, annotation to show any time or logic change to the preceding month's network, and the critical path.
- (b) A tabular report in PERT format showing, as a minimum, expected completion dates and slack. The tabular report shall only cover the program summary network events.
- (c) A narrative analysis covering:
 - (1) Technical Summary
 - (2) A summary of accomplishments during the month or activities underway.
 - (3) Rationale behind any time or logic changes.
 - (4) Present and potential problem areas along with any proposed corrective action.
 - (5) Planned work effort for the next reporting period.

The PERT report shall be prepared in accordance with the requirements of FAA-STD-007a.

3.6 Integrated Logistic Support. - The contractor shall develop an integrated logistic support plan for the complete ARSR system program covering both the prototype and production hardware. Logistic support is considered to include installation, instruction book and technical data, provisioning technical documentation and spares support and training.

3.6.1 Submission and approval. - The contractor shall furnish three copies of the initial integrated logistic support plan for approval to the Technical Officer (T. O.) within 90 days after contract award. Three copies of updated integrated support plan shall be furnished every 60 days thereafter until acceptance of the last ARSR system by the Government.

3.6.1.1 Installation. - An installation plan shall be developed 90 days prior to delivery of the first article for the installation, on-site shakedown and test effort required for a delivery schedule of two ARSR systems per month. The contractor shall schedule, coordinate, and staff the efforts required for the expeditious completion of the installation with an absolute minimum of disruption to on-going Government operations and the surrounding neighborhood. Once off-loading of buildings, antennas, and equipment has started, installation work shall proceed on a regular scheduled basis, normally 5 days per week, without lapse, through completion. The number and composition of the team(s) to satisfy the above requirements shall be included in the plan.

3.6.1.1.1 Government provided services. - The Government will have selected and acquired each radar site designated in the contract schedule and will have accomplished site preparation to include foundation and utility requirements for the ARSR modular buildings, standby engine generator shelter, and the ARSR tower.

3.6.1.1.2 Coordination. - Due to the interactive nature between Government and contractor activities at the radar site, close coordination and liaison is required. The Government and the contractor shall designate a single point of contact at the radar site. Changes in master installation schedules can only be made by the contracting officer no later than 120 days prior to start of a scheduled installation.

3.6.1.2 Instruction Book and Technical Data. - The contractor shall provide technical manuscripts in accordance with FAA-D-2494/1 and FAA-D-2494/2 for the instruction books and handbooks as set forth herein. "As-built/as-installed" technical data package will be furnished as specified herein. Copies of the instruction book and technical data shall be provided as specified in the contract schedule. The technical material shall be based upon the ARSR-3 system maintenance concept developed in accordance with the requirements of paragraph 3.1.4.1.1 of FAA-E-2483b and approved by the Government.

- (a) ARSR-3 Instruction Book
- (b) ARSR-3 Building Mechanical and Electrical Systems Equipment Instruction Book
- (c) ARSR-3 Radome Instruction Book
- (d) ARSR-3 Mobile Enroute Radar Facility (MERF) Instruction Book
- (e) As-built/As-installed Technical Data Package

3.6.1.2.1 Instruction Book. - Instruction books shall be prepared in accordance with FAA-D-2494/1, FAA-D-2494/2 and amendments and the respective equipment specifications (paragraph 3.3.2 and subsidiary paragraphs). Factory acceptance tests of the ARSR system will not be performed at the contractor's plant until the preliminary (review) instructions books and handbook (items (a) through (f) inclusive, paragraph 3.6.1.2) manuscript are approved by the Government.

- (a) Manuscript Plan and Schedule. Eight copies of the plan prepared in accordance with paragraph 3.4 and subsidiary paragraphs FAA-D-2494/1, shall be submitted to the Technical Officer for approval.

- (b) Draft Manuscript and Manuscript (Printers Copy). Copies prepared in accordance with paragraph 3.5 and 3.5.1, FAA-D-2494/1 shall be provided to the Technical Officer for approval as required in the contract schedule.
- (c) Validation Plan. Three copies of a manual validation plan in accordance with paragraph 4.4, FAA-D-2494/1, shall be provided to the Technical Officer for approval as required in the contract schedule.

3.6.1.2.1.1 Instruction Book for ancillary equipment. - Commercial instruction books supplemented where necessary to ensure adequate content may be used for ancillary equipment providing prior approval is obtained from the Technical Officer. The provisions of paragraph 3.6.1.2.1 are still applicable.

3.6.1.2.2 As-built/as-installed technical data package. - The contractor shall furnish two completed copies (3.4.1) of the technical data package for each site, specified in the subparagraphs below, to Government representative at the time of on-site acceptance. The technical data package shall consist of equipment, subsystem, and system schematic diagrams; equipment, subsystem, and system alignment and adjustment procedures; equipment, subsystem, and system replacement parts lists; factory (production) test procedures and reports; site acceptance test procedures and completed data sheets; on-site acceptance data; site construction drawings (Government furnished). The technical data package shall be designed such that each of its volumes is complete within itself but may be taken with the other volumes to make a complete system technical data package. The contractor shall certify that the technical data package reflects the ARSR system complex as-built and as-installed. The front cover of each volume of the technical data package shall be stamped "Certified As-Built/As-Installed," and bear the signature of the contractor's representative. The contractor may, at his option, use standard schematics, drawings, or text from troubleshooting manuals or instruction books, etc., where applicable to satisfy the technical data package requirements.

3.6.1.2.2.1 Submission and approval. - Five copies of the manuscript as-built/as-installed technical data package for the first article ARSR system shall be provided to the Technical Officer for approval ninety days prior to completion of on-site installation and checkout. One copy of the manuscript will be returned to the contractor with Government comments within 30 days of receipt by the Government. The contractor then shall resubmit corrected manuscripts within 10 days. Review and approval of succeeding production ARSR systems technical data packages shall be made on the basis of differences between those packages and the first article ARSR systems packages. Five copies of those pages that differ from the first article ARSR system package shall be submitted to the Technical Officer 60 days prior to scheduled acceptance of the ARSR system. The Government will approve or disapprove each submission within 10 days. The contractor shall then resubmit corrected pages within 5 days.

3.6.1.2.2.2 Schematic diagrams and drawings, Volume I. - Schematic diagrams and drawings, Volume I, shall also contain all equipment, subsystem, and system interconnecting wiring diagrams and illustrations necessary for the isolation and repair of troubles within the ARSR system complex. All diagrams shall be arranged to permit simple straight-forward tracing of functions.

3.6.1.2.2.3 Alignment and adjustment procedures, Volume II. - Alignment and adjustment procedures, Volume II, shall contain all equipment, subsystem, and system alignment and adjustment procedures necessary to maintain the ARSR system complex that are not contained in the instruction books for the subsystems. Each procedure shall identify the test equipment required, the expected outcome and the procedure for accomplishment. Adjustment parameters and settings shall be provided for electrical and mechanical equipment based on seasonal and operational variables at the installation site.

3.6.1.2.2.4 Parts list, Volume III, replacement parts list. - Parts list, Volume III, replacement parts list for the ARSR system shall be provided in accordance with paragraph 1.3.4.3 and paragraphs 3.6 and 3.8 of specification FAA-G-1210C.

3.6.1.2.2.5 Factory (production) test data, Volume IV. - Factory (production) test data, Volume IV, shall be furnished as specified in FAA-STD-013a.

3.6.1.2.2.6 Site construction drawings, Volume V. - Site construction drawings, Volume V, will be furnished by the Government for integration into the technical data package by the contractor.

3.6.1.2.2.7 Acceptance data, Volume VI. -

3.6.1.2.2.7.1 General concept. - The on-site acceptance data will be used as the basis for acceptance of the on-site installation, and testing at each site as specified in paragraph 3.8 and subsidiary paragraphs of this specification. In addition, this report, certified at time of system acceptance, will be used thereafter, in conjunction with the FAA commissioning report, as a maintenance reference data for engineering analysis of system performance during periodic inspections, or following corrective action to isolate problem areas weak points; and to establish continuity of certified system operation in event of an aircraft accident investigation.

3.6.1.2.2.7.2 Site data record (page i). - Site data record (page i) shall provide for the identification of the:

- (a) System type
- (b) Transmitter site
 - (1) facility designation
 - (2) facility type code

- (3) location identifier
- (4) facility place name
- (5) geographical coordinates
- (6) site locations

3.6.1.2.2.7.3 Acceptance record (page ii). - The acceptance record shall include site acceptance test procedures and completed data sheets and shall contain a statement of acceptance of the system complex by the Government as meeting the specification requirements and provide for signature of Government and contractor representatives.

3.6.1.2.2.7.4 Acceptance approval record (page iii). - The acceptance approval record shall contain the following:

Installation, adjustment, and performance of the facility are satisfactory and comply with requirements of system design.

For Airways Facilities Division

Technical Representative, Contract _____

This form shall bear the signature of a representative of each organization unit certifying, insofar as their responsibilities, that the facility is approved for contract acceptance.

Acceptance Date _____

3.6.1.2.2.7.5 Revision record (pages iv and v). - The revision record shall contain four columns with the following headings from left to right:

- (a) Reason for Change
- (b) Description of Change
- (c) Date of Change
- (d) Revision Made By

The "Reason for Change" column shall begin one inch from the left edge of each page. The "Description of Change" column shall begin 2 1/4"

from the left edge of each page. The "Date of Change" column shall begin at five inches from the left edge of each page. The "Revision Made By" column shall begin at 6 inches from left edge of each page and end at 7 inches from the left edge of each page.

3.6.1.2.2.7.6 Table of contents (pages vi...). - Table of contents shall be a complete listing of items in the report in the sequence in which they appear.

3.6.1.2.2.7.7 Sections. - The balance of the report shall be broken into sections as specified in the subparagraphs below. Entries in each section shall be organized such that all transmitter site related entries appear first.

3.6.1.2.2.7.7.1 Section I - Joint acceptance report. - Forms and data for this section will be inserted by the Government after contract acceptance.

3.6.1.2.2.7.7.2 Section II - Site Preparation. - Site preparation shall contain the necessary procedures and a checklist to insure that the site preparation has been accomplished in accordance with the requirements of this specification and the (GFM) site preparation construction package and is ready for the installation of the electronic equipment system package, E/G subsystems, tower and radome.

3.6.1.2.2.7.7.3 Section III - Mechanical and electrical installation. - Mechanical and electrical installation shall contain procedures and a checklist to insure that the installation of the buildings, tower, radome antennas, waveguides, cabling (wiring), power wiring, conduit, ductwork, support hardware, etc., have been installed in accordance with specification requirements and good engineering practices. The acceptance of all electrical and mechanical equipment, including the standby engine generator subsystem, shall be subject to proper operation in accordance with all requirements of this specification and the approved designs while functioning as an ARSR system complex at each establishment site. Equipment type tests and other such one-time tests which were satisfactorily passed at the manufacturer's plants need not be repeated at the field site; however, this shall not relieve the contractor from providing a complete, operating ARSR system complex and demonstrating the same.

3.6.1.2.2.7.7.4 Section IV - Operational Performance. - This section shall contain thorough procedures and recording spaces for accomplishing a technical appraisal of the system operational performance including the standby power plant where installed. All essential operational parameters, adjustment data, and meter readings necessary to determine acceptable performance or required for future verification for evaluation and comparison shall be included. Intermediate parameters, such as waveforms, voltages, or resistance measurements primarily used in

trouble-shooting and available in the instruction book are not required. Standards and tolerances extracted from applicable FAA specifications shall be included. In addition, data used for analyzing future performance, such as photographs of the master PPI for all individual and all combinations of videos from each radar functional capability (viz, MTI, LOG, Diversity, STC, FTC, Anti-Log, Weather Video, Clutter Profiles, SCV Measurements by echo box method in accordance with paragraph 3.14.10.1, FAA-E-2483b, etc.).

3.6.1.2.2.7.7.4.1 Format. - The information pages shall contain the following data (where applicable) for each parameter to be measured and recorded:

- (a) Parameter (name, test point, etc.)
- (b) Standard (standard value or setting)
- (c) Tolerance
- (d) Procedure and test equipment required for measurement
- (e) Equipment control settings
- (f) Space for data, photograph
- (g) Space for initials of person making measurement and an observer

3.6.1.2.2.7.7.5 Section V - Transmitted and received frequency authorizations. - Forms and data for this section will be furnished by the Government.

3.6.1.2.2.7.7.6 Section VI - Flight check reports. - Forms and data for this section will be inserted by the Government after acceptance from the contractor.

3.6.1.2.2.7.7.7 Section VII - Equipment inventory. - An inventory of all units installed in the system listed by FAA type number, unit description and unit serial number.

3.6.1.2.2.8 Facility commissioning. - The Government will be responsible for all commissioning procedures.

3.6.1.3 Provisioning Technical Documentation and equipment support. - The contractor shall provide provisioning technical documentation and equipment support plan including initial list of peculiar and site spares to the Technical Office (T. O.) for approval 90 days after contract award.

3.6.1.3.1 Provisioning Technical Documentation. - When required by the contract schedule the following documentation shall be furnished for the ARSR system in accordance with the applicable paragraphs noted below of Specification FAA-G-1210C of April 13, 1971 listed hereunder:

- (a) Long Lead Time Item List - paragraph 3.9
- (b) Provisioning Parts List - paragraph 3.6
- (c) Numerical Parts List - paragraph 3.8
- (d) Drawings - paragraph 3.16
- (e) Item Identification/Item Logistic Data Records - paragraph 3.10
- (f) Master Pattern and Plan View of Parts Layout - paragraph 3.11
- (g) Provisioning Screen Data - paragraph 3.17, Interpreted Electrical Accounting Machine (EAM) Cards are required.
- (h) Installation Material List - paragraph 3.18
- (i) Soft Consumable Items List - paragraph 3.12.1

Results of provisioning screening data obtained under Item (g) above to be included under the listings provided under Items (a), (b), and (c).

3.6.1.3.2 Spares Support. - The contractor shall provide the peculiar and site spares as required in the contract schedule.

3.6.1.3.3 Special Tools and Special Test Equipment. - All special tools, testing devices, or special test equipment, designed to perform only a specific function or purpose, shall be provided by the contractor. Special tools and special test equipment requirements are defined in the ARSR system specifications.

3.6.1.3.4 Repair and Touch-Up Kit. - The contractor shall provide in kit form, material and parts used to make minor repairs of dents, scratches, lost hardware, broken seals, floor tiles, etc. Any item of special manufacturer type shall be supplied in quantities consistent with estimated consumption for one year. The kit shall be packaged in a convenient and neat storage box. Included in the kit are extra floor tiles, floor tile adhesive, and various types of paint needed for repairing dents and scratches.

3.6.1.4 Training. - When required by the contract schedule, contractor conducted training of personnel shall be in accordance with the requirements of Specification FAA-E-2552, Technical Training.

3.7 Integrated System Test. - The contractor shall develop an integrated system test plan for the complete ARSR system program covering the various levels of in-plant and field tests. The plan shall cover all

of the tests required on the various ARSR system equipment specifications listed in paragraph 3.3.2 and subsidiary paragraphs and the on-site tests listed in paragraphs 3.8 and succeeding paragraphs. The requirements of paragraph 4.0 of ARSR-3 specification FAA-E-2483b are applicable on an ARSR system basis. The quality control plan required in paragraph 4.3.1 of FAA-E-2483b shall cover all ARSR system equipments except those furnished as government furnished equipment. If the ATCBI (3.3.2.2.1) and the ATCRBS Test Set (3.3.2.5) are government furnished, they shall be installed in the ARSR buildings as provided in paragraph 3.3.2.5 at the contractor's plant and performance checked at the factory and on-site in accordance with government approved test plans and procedures. Whenever practicable, tests for similar objectives may be combined, but shall be subject to Government approval prior to inception.

3.7.1 Submission and approval. - The contractor shall furnish three copies of the initial integrated system test plan for approval to the Technical Officer (T. O.) within 180 days after contract award. Three copies of the updated integrated test plan shall be furnished every 90 days thereafter until acceptance of the last ARSR system by the Government.

3.7.2 ATCBI Specification, FAA-E-2319b, Sections 4.4 and 4.4.1 - Production test and thirty hour system test shall be conducted on the ATCBI at the contractor's plant.

3.8 On-Site Installation and Test, ARSR System. - The contractor shall furnish all materials and services necessary to transport, install, align, and test the ARSR radar electronic equipment system packages including ARSR/ATCRBS antennas, ARSR tower and radome, and standby engine generator subsystems at locations specified by the Government. The ARSR electronic equipment packages shall be integrated with each other and installed into the ARSR modular buildings. The Government will have selected and acquired the radar site and accomplished site preparation to include foundation and utility requirements for the ARSR modular buildings and the ARSR tower. The ARSR radar system complex shall be completely operational and ready for FAA acceptance testing upon completion of these tasks. Any equipment, item, part, or service not specifically designated in the contract as Government furnished, necessary for proper operation of the systems in accordance with this specification, shall be furnished by the contractor even though that equipment, item, part, or service may not be specifically provided for or described herein. The Contractor shall furnish "as built" installation drawings and "as built/as installed" technical data package.

3.8.1 Air traffic control operating constraints. - When the construction, installation, and testing of equipment is performed in an operating environment, air traffic control activities and service shall have a priority over all contractor activities. There shall be no compromise

in the safe and timely control of aircraft during these phases. The design of installation and testing procedures shall be based on continued use of existing navigational aids. Installation services shall be performed in such a manner that disruptions to operating ATC facilities will be minimized. Contractor actions that will interfere with or in any way have an impact on Air Traffic Control activities and services shall be coordinated with and approved by the Contracting Officer or his designated representative in advance. COR shall insure that full concurrence has been obtained from the appropriate local ATC Supervisor prior to work activities which would be disruptive.

3.8.2 General installation requirements. -

3.8.2.1 Conduct of installation. - The contractor shall schedule, coordinate, and staff the efforts required for the expeditious completion of the installation with an absolute minimum of disruption to on-going Government operations and the surrounding neighborhood. Once off-loading of buildings, antennas, and equipment has started, installation work shall proceed on a regular scheduled basis normally 5 days per week, without lapse, through completion.

3.8.2.2 Grounding system. - An earth ground system will be provided by the Government at each site in accordance with FAA-C-1217. The separate ground systems of the buildings, substation, and towers shall be interconnected by the contractor to the earth ground system in accordance with FAA-C-1217c. Handholes and towers shall be grounded by the contractor in accordance with applicable drawings and specifications. The installed site system grounds shall meet the requirements of paragraph 3.3.1.

3.8.2.3 Power distribution loading. - The contractor shall connect all electrical loads to the site power distribution systems to provide for balanced loading (within 10%) of the three phases. This balance shall exist regardless of the operational status of the heating and air conditioning equipment.

3.8.2.4 Engine generator installation. - The contractor shall transport, set in place, and secure the E/G system in accordance with paragraph 3.1 of ARSR-3 Building Specification, FAA-C-2497a. The Government will have constructed the building footings, installed the fuel tank, and installed the electrical service to E/G shelters. Installation by the contractor shall include alignment, leveling, attachment of all detached items, connection to incoming commercial power, connection to fuel lines, and connection to electrical load, and all work required to ready the building and E/G system for operation. The installation shall be in accordance with Specifications FAA-C-1217c and local codes and requirements. Incoming commercial power cable and conduit shall be connected into the building power distribution system and the system energized. All distribution circuits shall be energized and checked for operation. Conduit and conductors to the site load shall be connected.

3.8.3 Standard system configuration installation. -3.8.3.1 Transmitter site. -

3.8.3.1.1 ARSR building installation. - The contractor shall transport, set in place of the Government-constructed foundation and secure the ARSR building furnished by paragraph 2.3.3. Installation shall include alignment, leveling, attachment of detached items such as canopies, skirts, steps, seals, and frames around openings and closures, unpacking and all other work required to ready the building for operation.

3.8.3.1.2 Water, sewage and fuel connection. - Incoming water line and outgoing sewer line shall be connected to ARSR building plumbing in accordance with paragraph 3.4.5, FAA-C-2497. Incoming fuel lines for the engine generator shall be connected in accordance with paragraph 3.5.8.2, FAA-C-2497.

3.8.3.1.3 Electrical connection. - Incoming power cable (GFM) and conduit (GFM) from the engine generator building shall be connected into the power distribution system in accordance with paragraph 3.5.3, FAA-C-2497. The power distribution system shall be energized and phase sequences checked. All power distribution circuits and building service systems, lights, HVAC, and outlets, shall be energized and checked for operation.

3.8.3.1.4 Antenna tower installation. - Foundations for the tower will be provided at each installation site by the Government using construction designs in accordance with FAA-C-2498. The antenna support tower provided by 2.3.4 shall be transported and erected by the contractor using the plans and specifications provided by FAA-C-2498 and Specification FAA-1247.

3.8.3.1.5 Radome installation. - The contractor shall transport, set in place, secure, and seal the radome provided by paragraph 2.3.5, complete with accessories, on top of the antenna support tower. Radome erection shall be in accordance with plans and specifications provided by FAA-C-2499a.

3.8.3.1.6 Installation of conduit, ductwork, and wiring. - All wiring, conduit, and raceways required to interconnect the ARSR modules shall be furnished and installed in accordance with the building plans and specifications. All wiring and conduit required to interconnect the antennas and tower to the power and electronic systems shall be furnished and installed.

3.8.3.1.7 Antenna placement and assembly. - The contractor shall rig, lift, place, and secure the individual components of the ARSR antenna and the ATCRBS omni-directional antenna on top of the antenna tower, and within the ARSR-3 radome. The antennas shall be installed level, plumb, and true to meet the requirements of the system design.

3.8.3.1.8 Waveguide, RF coaxial cable, and supporting hardware installation. - The contractor shall install the ARSR waveguide, the ATCRBS coaxial cable, and all necessary supporting hardware between the equipments and associated antennas.

3.8.3.1.9 Installation of signal and control interface. - The contractor shall install and connect all necessary signal and control interface cabling (wiring) between the ARSR building modules and the ARSR building and the antenna tower mounted equipment.

3.8.4 System alignment and checkout. -

3.8.4.1 System checkout. -

3.8.4.1.1 Engine generator subsystems. - The E/G subsystems and all ancillary equipment shall be placed in operation in accordance with paragraph 4 of Specification FAA-C-1244b. The 14-hour break-in run shall be accomplished in accordance with paragraph 4.4.1, FAA-E-2497a at the site.

3.8.4.1.2 Mechanical and electrical equipment. - All electrical and mechanical equipment provided by paragraph 3.3.2.6, 3.3.2.7 and 3.3.2.8 of this specification shall be aligned and adjusted to the proper operating parameter for the installation site. All equipment shall be operated to demonstrate compliance with the requirements of this specification and the approved designs. Test data shall be recorded in accordance with the approved Integrated Test Plan (paragraph 3.6.1.2.2.7.7.4 and paragraph 3.7.1).

3.8.4.1.3 Electronic equipment. - The contractor shall exercise all system controls to insure their proper operation. The ARSR system shall be properly aligned and tuned-up to peak performance. Test data shall be recorded in accordance with the approved Integrated Test Plan (paragraph 3.6.1.2.2.7.7.4 and paragraph 3.7.1).

3.8.4.1.4 Acoustic Noise Level. - Measurement of noise level with the ARSR system in operation shall be performed in accordance with paragraph 4.3.5 of FAA-C-2497a. Tests shall be performed at the field site with the ARSR system installed in the ARSR-3 building. The contractor shall take whatever corrective action is necessary subject to Government approval to obtain noise level compliance.

3.8.4.1.5 ARSR-3, ATCRBS Integrated Beacon Feed, and ATCRBS SLS antenna orientation and alignment. - The contractor shall align the ARSR, ATCRBS Integrated Beacon Feed and ATCRBS SLS omni-directional antennas in accordance with paragraphs 3.8.7.4, 3.8.7.4.1 and 3.8.7.4.2 of the ARSR-3 Specification FAA-E-2483b supplement 3 and orient the rigid combination of the antennas to magnetic north (± 0.1 degree). The azimuth position data system shall be properly zeroed.

3.8.5 Cleaning. - The contractor shall deliver to the Government a clean facility both inside and out and shall be responsible for requirements listed in paragraphs 3.8.5.1 and 3.8.5.2.

3.8.5.1 Interior. - The contractor shall remove all trash and foreign material from the interior of the buildings. Floors, walls, and ceilings shall be clean and free of all marks, holes, cracks, dents, and otherwise damaged surfaces. The floor shall be washed and waxed and all windows free of marks and clean.

3.8.5.2 Exterior. - The exterior of all buildings shall be cleaned of all dirt and film resulting from transportation and installation prior to acceptance by the Government. All trash, litter, packing dunnage, and excess material shall be removed from the facility area.

3.8.6 Installation personnel. - The contractor shall use only experienced, factory-trained personnel for installation and installation supervision of field work performed. Subcontractors used by the contractor for rigging, crane service, labor, trash removal, cable splicing, and other miscellaneous work and services shall be the direct responsibility of the contractor and under his direct supervision at all times.

3.8.7 Test equipment. - Where specialized test equipment, test jigs, etc., are required for the subsystem and system alignment and testing but is not required for the routine maintenance of the system, the contractor will be required to supply the necessary specialized test equipment, test jigs, etc.

3.8.8 Spare parts. - The Government will be responsible for supplying the necessary spare parts for Government Furnished Equipment during the installation checkout phase and acceptance testing of the ARSR system. The contractor shall maintain a log identifying all parts consumed during the installation, checkout and test phases of the program. The contractor shall supply the necessary spare parts for contractor furnished equipment during the installation, checkout, and test phase of the program. All parts consumed during this phase of the program will be replenished by the contractor so as to provide a complete set of original spares upon the acceptance of the equipment.

3.8.9 On-Site Test of ARSR System. - The Contractor shall perform the tests specified herein. Records of tests shall be kept complete and available to the Government as required by the contract. The Government reserves the right to witness or participate in any of the tests set forth in this specification. The tests shall be conducted by the contractor to demonstrate compliance with the specification according to test methods and procedures stated in Government approved test plan. The contractor shall furnish tests plans and procedures which shall detail the time, place, and manner in which the equipment shall be tested. These tests shall consist of the following.

<u>Tests</u>	<u>Reference Paragraph</u>
(a) Shakedown tests	3.8.9.4.1
(b) On-site acceptance tests	3.8.9.4.2
(c) On-site availability tests	3.8.9.4.3

Tests specified in (a) and (b) shall be conducted on each system installed on-site under this specification. Test (c) shall be performed on one system to be designated by the Government.

3.8.9.1 Procedures. - Submission and approval of tests procedures shall be as specified in FAA-STD-013a. Inspection system by the contractor shall be in accordance with MIL-I-45208A. Test equipment calibration requirements shall be in accordance with MIL-C-45662A.

3.8.9.2 Test equipment. - All special and built-in test equipment and tools required to be furnished by any specification referenced herein shall be available before testing begins. The Government will provide standard tools and test equipment, if available at the time of test. The contractor, however, shall be responsible to have tools and test equipment as listed on approved lists available for the tests.

3.8.9.3 Test conditions. -

3.8.9.3.1 Environment. - Unless otherwise specified, tests shall be conducted at ambient temperature of $25^{\circ}\text{C} \pm 10^{\circ}$.

3.8.9.3.2 Test power. - Equipment under test shall use prime power furnished the ARSR modular buildings for not more than 75% of the test time, the remainder of the time, the E/G shall be utilized as the power source.

3.8.9.3.3 Test plans. - The tests specified shall be conducted in accordance with a test plan submitted by the contractor which shall be subject to review and approval of the Government. If, during the tests, the test methods or parameters, as agreed to by the Government, are found by the Government to be inadequately specified, they will be amended by the contractor and shall require further approval of the Government before the tests are continued.

3.8.9.4 On-site tests. -

3.8.9.4.1 Shakedown tests. - These tests are described in paragraph 3.8.4.1. The purpose of these tests is to ascertain that the subsystems are functioning properly after on-site installation and that the transmitter site equipments as defined in this specification are ready for system tests. Tests of the electronic equipment, as specified in 3.8.4.1.3, shall include a demonstration of equipment operation with the engine generator subsystem as the power source (3.8.4.1.1).

3.8.9.4.2 On-site acceptance tests. - These tests are described in paragraph 4.3.7 of FAA-E-2483b ARSR-3 radar specification.

3.8.9.4.2.1 On-site test concepts. - The purpose of this test is to exercise the entire ARSR-3 system as herein defined with the purpose

of exposing faults and providing a demonstration to the Government that the entire subsystem/system is acceptable. Before on-site acceptance tests can commence, the contractor shall certify that:

- (a) All necessary calibrated test equipment is available.
- (b) (For those sites involving in-service relocations) The down time has been scheduled and approved by the on-site FAA Coordinator, if the test will interrupt other equipment installed in an operating environment.
- (c) All incompatibilities due to integration of equipment and systems are resolved.
- (d) Modifications that must be made before the system test can be satisfactorily completed are accomplished.
- (e) FAA participants and observers are briefed on the general objective of the tests.

3.8.9.4.3 On-site system availability tests. - These tests are described in paragraph 4.3.8 of FAA-E-2483b, ARSR-3 radar specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 General Requirements for inspection and test. - The contractor shall provide and maintain a quality control program for the ARSR system in accordance with FAA-STD-013a. All tests and inspections made by the contractor shall be subject to Government approval and inspection. Quality assurance provisions are covered under paragraph 3.7, Integrated System Test, and paragraph 3.8, On-Site Installation and Test, and as set forth in this specification.

5. PREPARATION FOR DELIVERY

5.1 Equipment. - The contractor shall be solely responsible for protecting, preserving, packing, marking, and delivery of all equipment to the field installation sites. The equipment shall arrive at the sites in full accordance with the requirements of this specification and acceptable for installation by the contractor.

5.2 Documentation. - The contractor shall be responsible for packing, marking, and shipping all documents required by this specification to locations to be specified in the contract schedule or by the contracting officer.

6. NOTES

6.1 Training. - The contract schedule shall specify, as prescribed by the Office of Training, the type (F & E, maintenance, OJT) and extent of contractor furnished training services and training material to be furnished.

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